Resolving taxonomic boundaries between *Eucephalus vialis* (=*Aster vialis*) and related species to determine conservation status

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Interim Report

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Introduction

Eucephalus vialis is a member of a group of closely related species throughout the western Washington, Oregon and California. It is listed as Threatened by the state of Oregon, and managed as a Sensitive Species by the USFS and a Special Status Species by the BLM. Formerly considered species of the genus *Aster*, the Eucephalus group is now considered a genus in its own right. Species boundaries in this group tend to be weak, and the species themselves are often locally distributed. For example, *E. gormanii* and *E. paucicapitatus* are locally rare endemics of the Cascades and Olympic Mountains/Vancouver Island, respectively. *E. vialis* is an example of a species in the complex that can be difficult to distinguish from others because it is intermediate in some characteristics. Thompson studied the group for his MSc. in 1977 at Oregon State University and described *E. vialis* as intermediate between *E. engelmannii* and *E. brickellioides*. Since then, Allen studied the group at OSU later and came to a similar conclusion. Current names for many of these taxa have changed since the recent publication of the Asteraceae volume of Flora of North America, but the taxonomic issues remain. The species making up the rayless or nearly-rayless group in southern Oregon and northern California include:

E. vialis
E. tomentellus (=*A. brickellioides*)
E. glabratus (=*A. siskiyouensis*)
E. breweri (intergrades with *tomentellus* and *glabratus*)

Agency botanists in western and southwestern Oregon have encountered numerous populations of these species during forest inventories and clearances in recent years, and the lack of clarity in the taxonomy of this complex has lead to uncertainty as to which populations are *E. vialis*, and which are other, related taxa. *Eucephalus tomentellus*, *E. glabratus* and *E. breweri* all occur in southern Oregon and Northern California and may be difficult to distinguish from *E. vialis* (and each other). *E. tomentellus* in particular appears to overlap with the range of recently located populations and will be emphasized in this project.

The Conservation Agreement (CA) for *E. vialis* identifies clarification of this taxonomic problem as the top priority research need. The CA also calls for agency collaboration between BLM, USFS and USFWS to accomplish this priority need through morphological and genetic studies.

Objectives -- The objective of this project is to determine the taxonomic boundaries between *E. vialis* (wayside aster) and its closest relatives. Currently, it is not clear to taxonomists and managers if the species occurs from the Eugene area south to northern California, or if it only occurs in the Eugene/Roseburg area. Resolving this uncertainty will allow managers to efficiently apply management actions for this protected species without conserving populations of other non-rare taxa. Information from this project will clarify the geographic range of *E. vialis* and its relationship with other, similar species from Lane County through southern Oregon.

Methods

Study sites/sample areas -- A total of 23 sample areas are included in this project to date, including four sub areas in the Chrome Ridge area. Table 1 lists all of the sites, which are also mapped in Figure 1. Site selection involved extensive coordination with agency botanists and local ecologists (e.g., Richard Brock) with specific knowledge of the species complex and pertinent locations.

Table 1. Sample site locations for *Eucephalus* populations included in the study. Leaf tissue and pressed specimens were collected at each site in 2007.

Site number	Collection No.	Site_Name	Management/Ownership
0	1629	Gowdyville Rd	BLM Eugene District
1	1631	Tolman Creek Road	USFS Siskiyou NF
2	1658	Shale City Road	BLM Medford District
3	1636	Quartz Gulch	USFS Siskiyou NF
4	1638	Wrangle Camp	USFS Siskiyou NF
5	1639	Deadman's point	USFS Siskiyou NF
6	1640	Cinnabar Mountain	USFS Siskiyou NF
7	1641	Elder Mtn Road	USFS Siskiyou NF
8	1642	Happy Camp Road	USFS Siskiyou NF
9	1643	Page Mountain Snowpark	USFS Siskiyou NF
10	1644	East Fork Illinois River	USFS Siskiyou NF
11	1645	Wimer Road	USFS Siskiyou NF
12	--	Lake Mountain (Rolle)	USFS Siskiyou NF
13	1646	Josephine Creek	USFS Siskiyou NF
14	1648	Cow Creek	BLM Medford District
15	1652	Packsaddle Road	BLM Roseburg District
16	1653	Beatty Creek	BLM Roseburg District
17	1654	Chrome Ridge-Flat top	USFS Rogue River NF
18	1655	Chrome Ridge-1	USFS Rogue River NF
19	1656	Chrome Ridge-2	USFS Rogue River NF
20	1657	Chrome Ridge-3	USFS Rogue River NF
21	1659	McDonald Peak	USFS Siskiyou NF
22	1663	Road 20-4-15	BLM Eugene District
23	1664	Perkins Creek	BLM Eugene District
24	1662	Spores Creek	BLM Eugene District
25	--	Bear Creek	BLM Eugene District
26	--	Lower 79th Street	BLM Eugene District

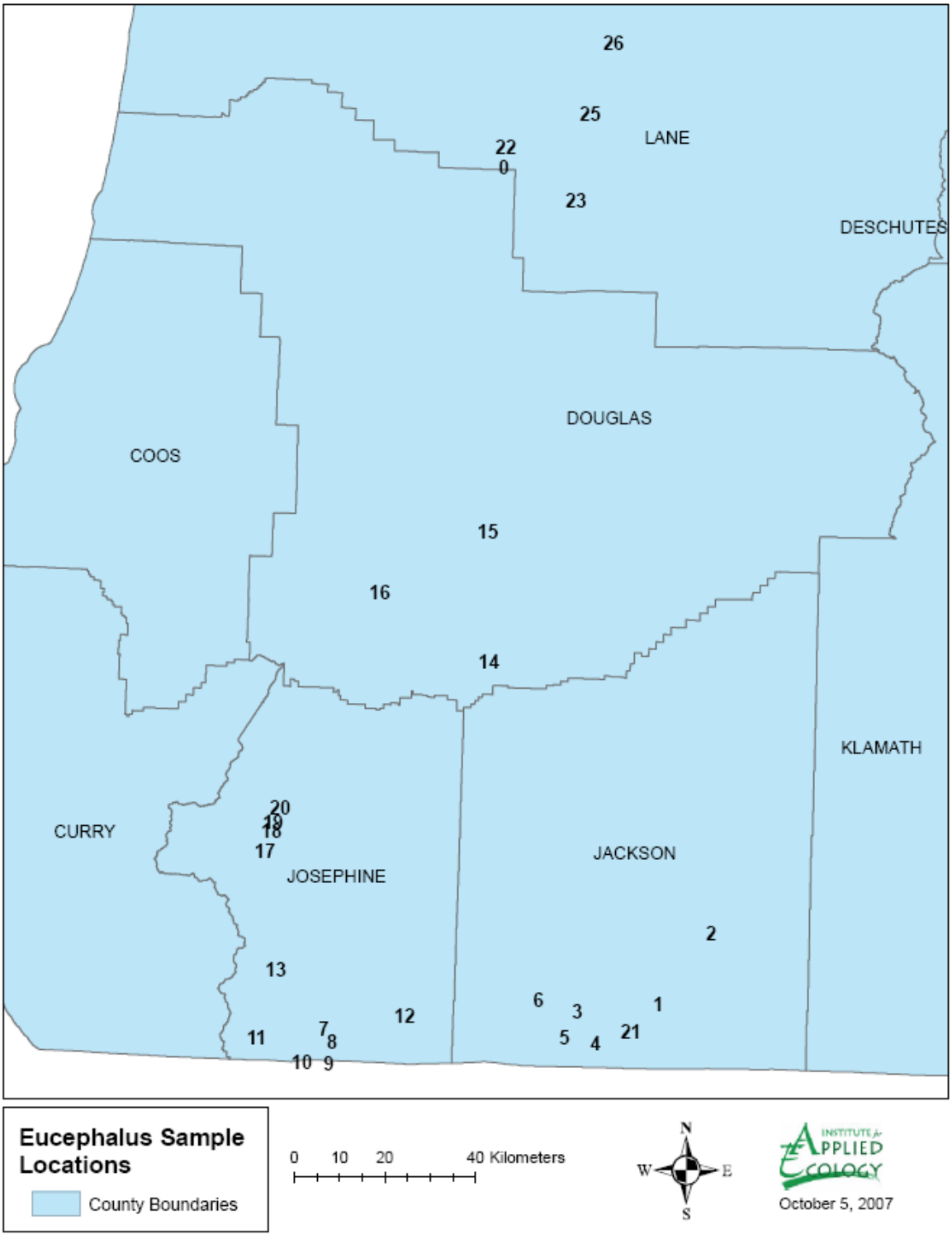

Figure 1. Sample locations for *Eucephalus* populations in Oregon and California (all sites visited in 2007). See Table 1 for additional details of each site.

Analytical tools -- This project will use morphometric and genetic tools to determine taxonomic boundaries in the Eucephalus-complex species under examination here. The morphometric approach will involve a random sample of individuals from populations in Lane and Douglas Counties, as well as additional populations from southern Oregon, including a selection of those populations thought to be *E. vialis*, as well as representative populations of *E. tomentellus, E. glabratus,* and *E. breweri*. Specimens from each population will be measured for several morphological characteristics, including reproductive and vegetative traits (precise list of traits to be determined based on evaluation of previous taxonomic treatments as well as field examinations). Habitat characteristics from each population sampled, including soil type, elevation, etc., will also be recorded.

The genetic approach for this project will emphasize isozymes, and will utilize the same samples used for the morphometric approach. This phase of the project will be performed by Geraldine Allen at the University of Victoria. Dr. Allen has extensive experience with this group and authored its treatment in the Flora of North America.

Project schedule

This project is planned for two budget years (FY 2007 and 2008). Work scheduled for calendar year 2007 has been completed, and remaining work will be conducted in 2008 and 2009 (see Table 2).

Table 2. Project schedule.

	Activity	2007				2008				2009		
		W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su
completed	Partner planning meeting		■									
	Sample collection and processing			■								
	Delivery of samples to lab for genetic analysis			■	■							
on-going or pending	Measurement of morphological plant traits				■							
	Morphometric/statistical analyses				■	■						
	Genetic tests and analyses					■	■	■				
	Interim report				■							
	Final report									■		
	Partner summary meeting (if needed)										■	

Project status

This project is on-going. This interim report contains information on what sites were visited in 2007. Work on morphological measurements and genetic analyses has not been conducted yet. The final report is anticipated in 2009.